Frank's
Umbrella Cutting
System

BY

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1913

Notation.

All dimensions are expressed in inches except radius of curvature which is expressed in feet.

r. c. = the radius of the curvature on the sides of sections.

R = length of ribs, ordinary commercial rating, so that

R = eye to eye dimension + .75

L = length of sections. D = depth of sections.

n = number of sections in cover.

v = the angle obtained by dividing 360° by 2n.

S' = the stretch of 23 ins. width of cloth.

S'' = the correction to be applied to D for stretch.

∂ prefixed to a letter indicates change in that dimension. Thus ∂L = the change in L.

l = the additional allowance that must be made in length in stacking the cloth when it lacks the proper width. This addition of course is to be cut to waste on the edge of the cloth.

Formulae.

$\text{r. c.} = .04\,\text{Rn}.$ .04 to .05

$$L = R\left(\frac{5.04}{n} + .06\right).$$

$$D = R\,(\cos v - .1207 + .0039n) + .08n.$$

$$S'' = .029\,S'D.$$

$\log \dfrac{S''}{S'D} = \bar{2}.46627.$ $\bar{2}.425$ to $\bar{2}.525$

For the transfer of an allowance from one dimension to the other:

$\partial L = -\dfrac{4\partial D}{n}.$ $\partial D = -\dfrac{n\partial L}{4}.$ 4 to 6

$\log L'' = \log L' + .6\,(\log D' - \log D'').$ .6 to .8

$\log D'' = \log D' + \dfrac{10}{6}(\log L' - \log L'').$ $\dfrac{10}{6}$ to $\dfrac{10}{8}$

$l = \dfrac{6.25}{n}\,(D_c + 3 - \text{width cloth}).$ 3 to 2¼

$l = 2\tan v\,(D_c + 3 - \text{width cloth}).$ 3 to 2¼

n	L/R	$\frac{D - .08n}{R}$	2 tan v	log 2 tan v	cos v
5	1.068	.7078	1.45	.16229	.809
6	.90	.7687	1.16	.06247	.866
7	.78	.8076	.96	9.98370	.901
8	.69	.8344	.83	9.91825	.9239
9	.62	.8541	.73	9.86210	.8397
10	.564	.8694	.65	9.81281	.9511
12	.48	.8920	.54	9.72908	.9659
14	.42	.9088	.46	9.65943	.9749
16	.375	.9225	.40	9.59969	.9808

The quantities L/R and $\frac{D - .08n}{R}$ are used for the computation of the entire values of L and D if n is unusual number. They are used also for the corrections to be applied to the values of L and D taken from the table computed to regular sizes when ribs are unusual length or notches unusual size. They are the corrections per inch of difference in rib length.

	n = 7			n = 8			n = 10			Variations		
R	L	D	s''/s'	L	D	s''/s'	L	D	s''/s'	s''/s'		
11	8.58	9.44	.28	7.59	9.82	.29	6.20	10.36	.30	.01	.02	.03
13	10.14	11.06	.32	8.97	11.49	.34	7.33	12.10	.35	.01	.03	.04
15	11.70	12.67	.37	10.35	13.16	.39	8.46	13.84	.41	.02	.03	.05
17	13.26	14.29	.42	11.73	14.82	.43	9.59	15.58	.46	.02	.03	.05
19	14.82	15.90	.47	13.11	16.49	.48	10.72	17.32	.51	.02	.04	.06
21	16.38	17.52	.51	14.49	18.16	.53	11.84	19.06	.56	.02	.04	.06
23	17.94	19.14	.56	15.87	19.83	.58	12.97	20.80	.61	.02	.05	.07
25	19.50	20.75	.61	17.25	21.50	.63	14.10	22.54	.66	.03	.05	.08
27	21.06	22.37	.65	18.63	23.17	.68	15.23	24.27	.71	.03	.05	.08
29	22.62	23.98	.70	20.01	24.84	.73	16.36	26.01	.76	.03	.06	.09
31	24.18	25.60	.75	21.39	26.51	.78	17.48	27.75	.81	.03	.06	.09
33	25.74	27.21	.80	22.77	28.17	.82	18.61	29.49	.86	.03	.07	.10
35	27.30	28.83	.84	24.15	29.84	.87	19.74	31.23	.91	.04	.07	.11